

- 31 -

CLAIMS:

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1. A detonator comprising:

- (i) a hollow detonator shell having an open end and a closed end;
- (ii) an igniting device at the open end of said shell;
- (iii) optionally a delay element adjacent said igniting device;
- (iv) an initiating element comprising an initiation portion and optionally a transition portion; and
- (v) optionally a base charge.

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characterized in that said initiation portion is at least partially contained within a confinement sleeve and comprises an intimate mixture of a relatively large particle size, porous, powdered explosive having interstitial spaces, and a relatively small particle size, high burn-rate pressurising initiator located within said interstitial spaces.

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2. A detonator as claimed in Claim 1 wherein said porous powdered explosive comprises PETN, RDX, HMX, Tetryl, TNT or a mixture thereof.

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3. A detonator as claimed in Claim 2 wherein said porous powdered explosive comprises PETN.

4. A detonator as claimed in Claim 3 wherein said PETN has a number average particle size of greater than 100 microns.

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5. A detonator as claimed in Claim 1 wherein said high burn-rate pressurising initiator is selected from the group consisting of potassium picrate, potassium styphnate, lead styphnate, potassium trinitrobenzoate, alkali or alkaline earth metal salts of nitro-aromatic compounds, and mixtures thereof.

6. A detonator as claimed in Claim 5 wherein said high burn-rate pressurising initiator is potassium picrate.

- 32 -

7. A detonator as claimed in Claim 1 wherein said high burn-rate pressurising initiator comprises a mixture of two separate components, namely a material having a high burn rate at low pressure and an oxidizer.

8. A detonator as claimed in Claim 7 wherein said oxidizer comprises 5 potassium perchlorate or ammonium perchlorate.

9. A detonator as claimed in Claim 8 wherein said oxidizer comprises potassium perchlorate.

10. A detonator as claimed in Claim 1 wherein said initiation portion comprises between 5 and 15% by weight of said oxidizer and between 5 and 15% 10 by weight of a material having a high burn rate at low pressure, which together form said pressurising initiator, and 70 to 90% by weight of said porous powdered explosive.

11. A detonator as claimed in Claim 1 wherein said transition portion comprises PETN, RDX, HMX, Tetryl or a mixture thereof.

15 12. A detonator as claimed in Claim 11 wherein said transition portion comprises PETN.

13. A detonator as claimed in Claim 12 wherein said PETN is pressed to a density of between 1.0 and 1.2 g/cc.

20 14. A detonator as claimed in Claim 1 wherein said confinement sleeve is a steel, copper or stainless steel sleeve.

15. A detonator as claimed in Claim 14 wherein said confinement sleeve is a circular sleeve having a wall thickness of between 0.1 and 1.5mm.

25 16. A detonator as claimed in Claim 1 wherein said initiation portion comprises a mixture of 5 to 15% by weight potassium picrate having an average particle size of less than 10 microns, 5 to 15% by weight potassium perchlorate having a particle size of less than 10 microns, and 70 to 90% by

- 33 -

weight PETN having a particle size of greater than 100 microns, and wherein said initiation portion has been pressed into a confinement sleeve so as to have a density of between 1.2 and 1.5 g/cc.

17. A detonator as claimed in Claim 16 wherein said transition portion  
5 comprises PETN having a particle size of greater than 100 microns and has been  
pressed into a confinement sleeve so as to have a density of between 1.0 and 1.2  
g/cc.

18. A detonator as claimed in Claim 1 wherein said initiation portion  
comprises additional components selected from the group consisting of  
10 explosives, propellants, gas-generating compounds, organic fuels, binders and  
combinations thereof.

19. A detonator as claimed in Claim 1 wherein said igniting device  
comprises a flame and/or shock wave from an electric match, a bridge wire, a  
shock tube, a safety fuse or a detonating cord which is inserted into the open end  
15 of the detonator shell.

20. A detonator as claimed in Claim 1 wherein said detonator comprises  
an electronic detonator.

21. A detonator as claimed in Claim 1 which is essentially free of added  
primary explosives.

20 22. A detonator as claimed in Claim 1 comprising a delay element  
adjacent said igniting device, so as to form a delay detonator.

23. A detonator as claimed in Claim 1 wherein said detonator is impact  
resistant.

24. A detonator as claimed in Claim 1 wherein said detonator is  
25 propagation resistant.

25. An in-hole detonator comprising:

- 34 -

(i) a hollow detonator shell having an open end and a closed end;

(ii) an igniting device at the open end of said shell;

(iii) optionally a delay element adjacent said igniting device;

5 (iv) an initiating element comprising an initiation portion adjacent said delay element or said igniting device, and optionally a transition portion; and

(v) a base charge,

characterized in that said initiation portion is at least partially contained within a  
10 confinement sleeve and comprises an intimate mixture of a relatively large particle size, porous, powdered explosive having interstitial spaces, and a relatively small particle size, high burn-rate pressurising initiator located within said interstitial spaces.

26. A surface detonator comprising:

15 (i) a hollow detonator shell having an open end and a closed end;

(ii) an igniting device at the open end of said shell;

(iii) optionally a delay element adjacent said igniting device; and

(iv) an initiating element comprising an initiation portion adjacent  
20 said delay element or said igniting device, and optionally a transition portion,

characterized in that said initiation portion is at least partially contained within a confinement sleeve and comprises an intimate mixture of a relatively large particle size, porous, powdered explosive having interstitial spaces, and a relatively small  
25 particle size, high burn-rate pressurising initiator located within said interstitial spaces.

27. A surface detonator comprising:

30 (i) a hollow detonator shell having an open end and a closed end;

(ii) an igniting device at the open end of said shell;

- 35 -

- (iii) optionally a delay element adjacent said igniting device; and
- (iv) an initiating element comprising an initiating portion adjacent said delay element or said igniting device,

characterized in that said initiation portion is at least partially contained within a  
5 confinement sleeve and comprises an intimate mixture of a relatively large particle  
size, porous, powdered explosive having interstitial spaces, and a relatively small  
particle size, high burn-rate pressurising initiator located within said interstitial  
spaces, and wherein said initiation portion achieves only a low order detonation.

28. A surface detonator as claimed in Claim 26 or 27 wherein said  
10 detonator additionally comprises a base charge, and wherein the shock wave  
produced by said base charge is reduced by using a diluted base charge or a low  
density base charge.

29. An initiating element for use in a detonator comprising an initiation  
portion and optionally a transition portion wherein said initiation portion is at least  
15 partially contained within a confinement sleeve and comprises an intimate mixture  
of a relatively large particle size, porous, powdered explosive having interstitial  
spaces, and a relatively small particle size, high burn-rate pressurising initiator  
located within said interstitial spaces.

30. A process for manufacturing a detonator as claimed in Claim 1  
20 comprising, in order:

- (i) optionally inserting a base charge into a detonator shell;
- (ii) inserting an initiating element comprising an initiation portion  
and optionally, a transition portion, into said detonator shell;
- (iii) optionally inserting a delay element into said detonator shell;  
25 and
- (iv) inserting an igniting device into said detonator shell;

wherein all components are operationally adjacent each other, and wherein said  
initiation portion comprises an intimate mixture of a relatively large particle size,  
porous powdered explosive having interstitial spaces, and a relatively small

- 36 -

particle size, high burn-rate pressurising initiator located within said interstitial spaces.

31. A process as claimed in Claim 30 additionally comprising the step of  
5 granulating the initiation portion.

32. A process as claimed in Claim 31 wherein said initiation portion is combined with a granulating agent prior to granulation.

33. A method of blasting comprising initiation of an explosive charge utilising at least one detonator, wherein the at least one detonator is as claimed in  
10 Claim 1.

34. A composition suitable for use in an explosive detonator, the composition comprising an intimate mixture of a relatively large particle size, porous, powdered explosive having interstitial spaces, and a relatively small particle size high burn rate pressurising initiator located within said interstitial  
15 spaces.